

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

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Assignee.....Micron Technology, Inc.
Group Art Unit.....1763
Examiner Zervigon, Rudy
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Title: Apparatus for Improved Delivery of Metastable Species

BRIEF OF APPELLANT

To: MS Appeal Brief - Patents
Assistant Commissioner for Patents
Washington, D.C. 20231

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Appellant appeals from the October 31, 2006 Final Office Action rejecting claims 1-17. A check is enclosed in the amount of \$500.00 in payment of the fees required under 37 CFR § 41.20(b)(2).

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I. REAL PARTY IN INTEREST.

The real party in interest of this application is Micron Technology, Inc. as evidenced by the assignment of the pending application to such party recorded at reel 012643, frames 0954-0958 on February 25, 2002, in the Assignment Branch of the Patent and Trademark Office.

II. RELATED APPEALS AND INTERFERENCES.

There are no appeals or interferences which will directly affect, be affected by, or have a bearing on the Board's decision in the pending appeal.

III. STATUS OF THE CLAIMS.

Claims 1-17 are pending in the application with claims 18-48 being previously canceled from the application. Claims 1-17 stand finally rejected and are the basis for the present appeal.

IV. STATUS OF AMENDMENTS.

No amendments have been filed in the application subsequent to final rejection.

V. SUMMARY OF THE CLAIMED SUBJECT MATTER.

A concise explanation of the invention defined in the claims that are the subject of the present appeal follows.

The invention pertains to a deposition system 10 as depicted in Fig. 1. The deposition system includes a deposition chamber 12 having an inlet port 16 (paragraph 18). The system includes a first reservoir external to the deposition chamber for containment of a first metastable specie (paragraphs 19 and 22). The first reservoir has an outlet port 18 in selective fluid communication with chamber inlet port 16 (paragraph 19). A metastable specie generating catalyst 20 is provided within reservoir 14 (paragraph 25).

Referring to independent claim 13 a deposition apparatus 10 as shown in Fig. 1 has a deposition chamber 12 having a first volume (paragraph 18). At least one containment reservoir 30 is disposed external to the deposition chamber 12 (paragraph 19) and is fluidly connected to the deposition chamber and has a second volume at least about 1% of the volume of the deposition chamber (paragraph 39). A remote metastable specie source 38 is in fluid communication with at least one of the containment reservoirs (paragraph 26).

With respect to independent claim 17 an atomic layer deposition apparatus 10 as depicted in Fig. 1 includes a deposition chamber 12 having a first inlet 34, a second inlet 16, a dispersion head 28 and a substrate platform 24, with the dispersion head being positioned between the first inlet and the substrate platform and between the second inlet and the substrate platform (paragraph 18). A first activated specie containment reservoir 30 is disposed external to the deposition chamber 12 and in fluid communication with the deposition chamber through the first inlet 34 (paragraph 19). A second activated specie containment reservoir 14 external to the deposition chamber is in fluid communication with the deposition chamber through second inlet 16 (paragraph 19). One or more carrier gas

sources 22, 36 are configured to deliver carrier gas through at least one of the first inlet 34 and second inlet 16 (paragraph 28).

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL.

The grounds of rejection presented for review and position of the Office are concisely stated as follows.

The rejection of independent claims 1 and 17, and of claims 2-3 and 5-11, which depend from claim 1, under 35 U.S.C. § 102(b), or alternatively under 35 U.S.C. § 103(a).

Claims 1-3, 5-11 and 17 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Gadgil (U.S. Patent No. 5,284,519); or alternatively under 35 U.S.C. § 103(a) as being unpatentable over a combination of Gadgil and Lee (U.S. Patent No. 6,086,679). The Office indicates reliance upon the Gadgil reference as disclosing a deposition system depicted in Figs. 1, 2 and 18 having a deposition chamber 2 shown in Fig. 18 with an inlet port “bottom of 38” in Fig. 2 and a first reservoir 44 of Fig. 2 external to the deposition chamber (with reference to numeric identifier 10 of Fig. 1, 38 of Fig. 2 and 2 of Fig. 18). The Office contends that such is “configured for containment of a first metastable specie” (Action at page 3). Gadgil is further relied upon as disclosing the first reservoir having an outlet port with reference to the top of numeric identifier 38 of Fig. 2 in

selective fluid communication with inlet port referring to the bottom of numeric identifier 38 of Fig. 2.

With respect to the claim 1 recited “metastable specie generating catalyst within the first reservoir” the Office contends that such is an intended use relying upon Walter, 618 F.2d at 769, 205 USPQ at 409; and MPEP § 2106. In support of the intended use reading the Office further relies on in re Casey, 152 USPQ 235 (CCPA 1967); In re Otto, 136 USPQ 458, 459 (CCPA 1963); and MPEP 2111.02).

With respect to claim 17, Gadgil is relied upon as disclosing a deposition system having a substrate platform 16 as depicted in Fig. 1 and a dispersion head 12 of Fig. 1 between an inlet port bottom of 38 of Fig. 2, and the substrate platform 16 of Fig. 1. With respect to the claim 17 recited “carrier gas” the Office again contends that such is a recited intended use relying upon Walter, In re Casey, In re Otto, MPEP §§ 2106 and 2111.02. Lee is indicated as being relied upon as disclosing various catalyst metals (Pt or Zn, present Action at page 7) or for providing carrier gas source in selective fluid communication with a deposition chamber (present Action at page 8). The Office indicates that it would be obvious to combine Lee with Gadgil to add Lee’s precursor materials to Gadgil’s reservoirs to create polymer thin films as taught by Lee.

The rejection of dependent claims 4 and 12, and of independent claim 13 and claims 14-16 which depend therefrom, under 35 U.S.C. § 103(a).

Claims 4, and 12-16 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Gadgil in view of Lee (U.S. Patent No. 5,395,482). With respect to independent claim 13, Gadgil is relied upon as disclosing a deposition chamber 2 as depicted in Fig. 18

having a first volume 2 with at least one containment reservoir 44 and 40 disposed externally to the deposition chamber 10, Fig. 1 “appears to be 38”. The Office indicates that the containment reservoir 44, 40 has a second volume indicating reliance upon numeric identifier 34 of Fig. 2 with Gadgil’s second volume 34 of Fig. 2 being at least about 1% of the volume of numeric identifier 2 of Fig. 1. The Office further indicates a remote metastable specie source in fluid communication with at least one containment reservoir “as claimed by claim 13”.

Lee is relied upon as disclosing a heat source configured to heat a catalyst. The Office contends that it would be obvious to combine Lee and Gadgil to add Lee’s heat source to, and reproduce Gadgil’s reservoirs and inlet ports under optimal relative dimensions. The Office contends that motivation to add Lee’s heat source and optimize relative dimension of Gadgil’s reservoirs is to create polymer thin films as taught by Lee.

Drawings

The drawings stand objected to under 37 CFR 1.83(a). The Office contends that the drawings fail to show each and every feature of the invention specified in the claims. The Action indicates that the recited “dispersion head” (claim 17) must be shown or the feature canceled from the claims. The Examiner maintains the objection to the drawing indicating that the recited dispersion head is not in 1:1 correspondence with the disperser 28 as shown in Fig. 1.

VII. ARGUMENT.

The rejection of independent claims 1 and 17, and dependent claims 2-3 and 5-11 as being anticipated by Gadgil, or alternatively as being rendered obvious by Gadgil in view of Lee, should be overturned since the relied upon reference(s) fail to teach every element recited in any of those claims.

Claims 1-3, 5-11 and 17 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Gadgil (U.S. Patent No. 5,284,519). In accordance with MPEP § 2131, anticipation requires each and every element of a claim to be disclosed in a single prior art reference. Each of claims 1-3, 5-11 and 17 stands alternatively rejected under 35 U.S.C. § 103(a) as being unpatentable over Gadgil in view of Lee (U.S. Patent No. 6,086,679). In accordance with MPEP §§ 2142 and 2143, a proper obviousness rejection has the following three requirements: 1) there must be some suggestion or motivation to modify or combine reference teachings; 2) there must be a reasonable expectation of success; and 3) the combined references must teach or suggest all of the claim limitations. In order to establish a *prima facie* case of obviousness, each of these three factors must be shown, the burden of which is upon the Office (MPEP § 2142). Appellant respectfully submits that the Office has failed to meet this burden, no *prima facie* case has been established, and that claims 1-3, 5-11 and 17, are therefore allowable over Gadgil and Lee.

Each of independent claims 1 and 17 recites a deposition system or apparatus comprising a deposition chamber and a containment reservoir which is external to the deposition chamber where the reservoir is in fluid communication with the deposition chamber through an inlet of the deposition chamber. The Office indicates reliance upon Gadgil as disclosing a deposition chamber 2 relying upon Fig. 18 having a first reservoir

relying upon Fig. 2 and as having such reservoir externally disposed indicating reliance upon feature 10 of Fig. 1. Applicant notes however that Fig. 2 and Fig. 1 are entirely distinct embodiments and as such are not combinable for purposes of anticipation. Neither of the two embodiments anticipates either of claim 1 or 17 and as distinct embodiments are non-combinable. Further, there is not suggestion or motivation within the references for combining such embodiments in the manner suggested by the Office and none is set forth by the Office for purposes of a § 103 obviousness-type rejection. The Office indicates at page 11 of the present Action that it is not attempting to combine embodiments. Accordingly, the Office fails to provide motivation for the “combination” or “modification” to establish a *prima facie* case.

With respect to claims 1 and 17, the Office indicates that the claim 1 recited catalyst and the claim 17 recited carrier gas are merely intended uses (pages 3 and 6 of the present Action) and therefore reads such limitations out of the claims. The Office indicates reliance upon the Walter decision (618 F.2d at 769, 205 USPQ at 409; MPEP §2106) indicating that specification of intended use or field of use for an invention generally will not limit the scope of a claim. The Office further indicates reliance upon MPEP § 2111.02. These grounds of rejection are maintained from the previous Office Actions. As noted in applicant’s previous responses, § 2106 of the MPEP addresses computer-related inventions. Since the present application and the pending claims are not directed toward computer-related subject matter, reliance upon MPEP § 2106 is improper. Similarly, the Office’s reliance upon MPEP § 2111.02 and the cases cited therein is equally improper since such is clearly identified as being applicable for determination of the effect of the claim preamble while the recitation at issue is within the body of the claim. Appellant has repeatedly requested that if such grounds of rejection were to be maintained that

appropriate authority be cited. However, no such authority has been provided and therefore such maintained rejection and reading out of elements of Appellant's claims is improper.

As indicated above, each of independent claims 1 and 17 recites a deposition system or apparatus having a containment reservoir. In claim 1, such reservoir is in selective fluid communication with the deposition chamber. The Office again combines features of distinct embodiments relying upon Gadgil, Fig. 1 in combination with Gadgil, Fig. 2. The Office further identifies the bottom of feature 38 of Fig. 2 as both an inlet port and an outlet port while inlet nozzles 42 and 46 have been clearly identified by the specification for introducing gas into corresponding mixing chamber 40 and 44. Accordingly, it is unclear as to how the Office interprets Gadgil to provide selective fluid communication and/or containment within a chamber via feature 38 which the Office refers to as an inlet port and an outlet port, but which Gadgil identifies as a capillary group (col. 5, ll. 1-15). Nor does the capillary group provide containment or selective communication. Since each of claims 1 and 17 recites containment reservoirs and claim 1 specifically recites selective fluid communication from the containment reservoir, such claims are clearly not anticipated or rendered obvious by Gadgil.

Lee is relied upon as disclosing Pt or Zn catalysts and disclosing a carrier gas source. However, these teachings when combined with Gadgil do not contribute toward suggesting the claims 1 and 17 recited containment reservoirs or the claim 1 recited selective fluid communication between the reservoir outlet port and the inlet port of the deposition chamber. Nor do the two references, when considered in combination, provide a basis for a reasonable expectation of success for achieving the recited containment reservoirs or the recited selective fluid communication. Accordingly, claims 1 and 17 are

not anticipated by Gadgil or rendered obvious by the combination of Gadgil and Lee and are allowable over these references.

Dependent claims 2-3 and 5-11 are allowable over Gadgil and Lee for at least the reason that they depend from allowable base claim 1.

The rejection of dependent claims 4 and 12, independent claim 13, and its dependent claims 14-16 should be overturned since a *prima facie* case of obviousness has not been established.

Claims 4 and 12-16 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Gadgil in view of Lee. In accordance with MPEP §§ 2142 and 2143, a proper obviousness rejection has the following three requirements: 1) there must be some suggestion or motivation to modify or combine reference teachings; 2) there must be a reasonable expectation of success; and 3) the combined references must teach or suggest all of the claim limitations. In order to establish a *prima facie* case of obviousness, each of these three factors must be shown, the burden of which is upon the Office (MPEP § 2142).

Appellant respectfully submits that the Office has failed to meet this burden, no *prima facie* case has been established, and that claims 4 and 12-16, are therefore allowable over Gadgil and Lee.

As set forth above, Gadgil fails to disclose each and every element in the independent claim 1. Further, the Gadgil disclosure does not suggest the claim 1 recited features including the first reservoir configured for containment of a first metastable specie or the first reservoir comprising an outlet port in selective fluid communication with the inlet port of the deposition chamber. As further discussed above, Lee does not contribute

towards these recited features. Claim 1 is therefore not rendered obvious by the combination of Gadgil and Lee and is allowable over these references. Dependent claims 4 and 12 are allowable over the combination of Gadgil and Lee for at least the reason that they depend from allowable base claim 1.

Independent claim 13 recites at least one containment reservoir. Claim 13 further recites that the at least one containment reservoir has a volume that is at least 1% of the volume of the deposition chamber. With respect to the recited containment reservoir, claim 13 is allowable over Lee and Gadgil for at least reasons similar to those discussed above with respect to independent claims 1 and 17.

Applicant notes that in determining relative volumes of the Gadgil's deposition chamber relative to an "at least one containment reservoir" the Office compares features to Fig. 1 and feature 34 of Fig. 2. Such features are from entirely different embodiments and are therefore not directly comparable for determining relative volume or "optimization" as suggested by the Office. Lee is indicated as being relied upon as disclosing a heat source for heating a catalyst. However, such teaching when combined with Gadgil fails to contribute toward suggesting the claim 13 recited at least one containment reservoir where the containment reservoir has a volume which is at least about 1% of the volume of the deposition chamber. For these reasons claim 13 is not rendered obvious by the combination of Gadgil and Lee and is allowable over these references.

Dependent claims 14-16 are allowable over Gadgil and Lee for at least the reason that they depend from allowable base claim 13.

The objection to the drawing should be withdrawn since a 1-to-1 correspondence exists

The drawing stands objected to under 37 CFR § 1.83(a). The Office indicates that a dispersion head must be shown and requests a 1:1 correspondence with what is claimed and elements in the specification in support of the drawing (present Action at page 10). Referring to Fig. 1, such specifically illustrates a disperser having numeric identifier 28. Appellant's specification at paragraph 18 indicates that disperser 28 can be a porous dispersion head or showerhead, for example. The disperser, which as stated can be a dispersion head, corresponds directly to numeric identifier 28 in a 1:1 correspondence. The 1:1 correspondence requirement is therefore met in the drawings as filed. Applicant is not required to depict a particular embodiment envisioned by an Examiner. Accordingly, the objection to the drawings should be withdrawn.

Conclusions

For the reasons discussed above, claims 1-17 are allowable over the art of record and the objection to the drawing is in error. In view of the forgoing, reversal of the final rejection of claims 1-17 and formal allowance of such claims is respectfully requested.

Respectfully submitted,

Dated: April 9, 2007

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VIII. CLAIMS APPENDIX.

Claims 1-17, which stand finally rejected and are the basis of the present appeal, are presented below.

1. A deposition system comprising:
a deposition chamber having an inlet port;
a first reservoir external to the deposition chamber configured for containment of a first metastable specie, the first reservoir comprising an outlet port in selective fluid communication with the inlet port of the deposition chamber; and
a metastable-specie generating catalyst within the first reservoir.
2. The deposition system of claim 1 wherein the catalyst comprises Pt.
3. The deposition system of claim 1 wherein the catalyst comprises Zn.
4. The deposition system of claim 1 further comprising a heat source configured to heat the catalyst.
5. The deposition system of claim 1 further comprising a carrier gas source in selective fluid communication with the deposition chamber through the inlet port.

6. The deposition system of claim 1 further comprising:

a substrate platform; and

a dispersion head between the inlet port and the substrate platform.

7. The deposition system of claim 1 further comprising:

a second reservoir configured for containment of a second metastable specie, the second reservoir comprising a second reservoir outlet port in selective fluid communication with the deposition chamber.

8. The deposition system of claim 7 wherein the inlet port of the deposition chamber is a first inlet port, the deposition chamber further comprising a second inlet port, wherein the outlet port of the second reservoir is in selective fluid communication with the deposition chamber through the second inlet port.

9. The deposition system of claim 7 wherein the metastable-specie generating catalyst is a first metastable-specie generating catalyst, and further comprising a second metastable-specie generating catalyst within the second reservoir.

10. The deposition system of claim 7 further comprising a carrier gas source in selective fluid communication with the deposition chamber through the second inlet port.

11. The deposition system of claim 7 further comprising:
a remote metastable specie source, wherein the second reservoir comprises an inlet port in fluid communication with the remote metastable specie source.

12. The deposition system of claim 11 wherein the remote metastable specie source comprises a metastable specie generator comprising one or more of a plasma source, a catalyst, a heater, an electron gun, a UV light source and a microwave source.

13. A deposition apparatus comprising:
a deposition chamber having a first volume;
at least one containment reservoir disposed external to the deposition chamber, fluidly connected to the deposition chamber and having a second volume, the second volume being at least about 1% of the first volume;
a remote metastable specie source in fluid communication with at least one of the containment reservoirs.

14. The apparatus of claim 13 wherein the second volume is greater than or equal to about 10 % of the first volume.

15. The apparatus of claim 13 wherein the second volume is greater than or equal to about 50 % of the first volume.

16. The apparatus of claim 13 wherein the second volume is equal to or greater than the first volume.

17. An atomic layer deposition apparatus comprising:

a deposition chamber having a first inlet, a second inlet, a dispersion head, and a substrate platform; the dispersion head being positioned between the first inlet and the substrate platform and between the second inlet and the substrate platform;

a first activated specie containment reservoir external to the deposition chamber and in fluid communication with the deposition chamber through the first inlet;

a second activated specie containment reservoir external to the deposition chamber and in fluid communication with the deposition chamber through the second inlet; and

one or more carrier gas sources configured to deliver carrier gas through at least one of the first inlet and the second inlet.

IX. EVIDENCE APPENDIX.

None entered.

X. RELATED PROCEEDINGS APPENDIX.

No decisions entered.